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"On the Value of the Nearctic as one of the Primary Zoological Regions," by Angelo Heilprin.

On Remains of Horses.—Prof. Leidy directed attention to some specimens, which were recently sent to him for examination by the Secretary of the Smithsonian Institution. He remarked that it was commonly believed that the horse was not living in America when this was discovered by Europeans, but there is abundance of evidence to prove the former existence in this country of many species and genera of closely related forms. Among the remains of these some are undistinguishable in anatomical characters and size from the corresponding parts of the domestic horse. As this during the past four centuries has become widely and abundantly distributed over both continents, its remains have become buried everywhere, and often in the older deposits, where they are mingled with the fossils pertaining to the latter. Under these circumstances it is commonly difficult and frequently impossible to determine whether specimens submitted to us for examination are to be regarded as true fossils or comparatively recent remains. Such is the character of the specimens now exhibited.

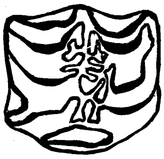
Several consist of fragments (No. 16537–8) of the left ramus of the mandible of a horse. They were obtained at Aspinwall, Panama, by Capt. J. M. Dow; but no reference is made to the nature of the deposit in which they were found. They are well preserved, firm in texture, without fissures, and stained brown from ferruginous infiltration. One of the fragments contains the molar series nearly perfect except the first and last. They are more than half worn away and agree closely with those of the domestic horse in the same condition.

Other specimens consist of an astragalus and a first phalanx (16602, 16604) of a horse of the ordinary size. They were obtained by Mr. J. F. Le Baron, U. S. Assist. Eng., on Peace Creek, Florida, in 1881, during the survey of a steamboat route from the St. John's River to Charlotte harbor. They were discovered in association with remains of the elephant, *Elephas columbi*, and a huge turtle remarkable for the thickness of its shell, etc. The specimens are black and well preserved, but exhibit no peculiarity.

The remaining specimens are of more interest than the preceding, and consist of two bone fragments and three teeth (Nos. 1–5, 11629), which were obtained by Mr. Ellis Clarke, Jr., from near Lacualtipan, Hidalgo, Mexico. According to the accompanying letter, they were discovered in a thirty inch clay bed, lying between an upper four inch, and an under four feet stratum of coal, overlying a limestone with small shells. The fossils belong to the three-toed horse, *Hippotherium* (*Hipparion*), and are probably of pliocene age, though they may be miocene.

Of the bone fragments one is the upper extremity of a metatarsal, exhibiting on each side behind the articular impressions of the smaller metatarsals. The articular end measures 13 lines transversely and 11 lines fore and aft. The other fragment is the proximal articular end of a first phalanx, measuring 14 lines transversely and 8 lines fore and aft. Of the teeth two are lower molars, apparently of different individuals. One, a fourth or fifth of the series, is little worn, but has lost its exterior cementum. It is about 2 inches long and at the triturating surface measures 9 lines fore and aft and 4½ lines transversely. The other lower molar, probably the third of the series, is about half worn, but is broken away below, and yet retains its outer cementum. It measures 9 lines fore and aft and 5 lines transversely. The remaining tooth, the most characteristic of the specimens, is an upper molar, apparently the fourth of the series of the right side. It is but little worn, is well preserved and retains its exterior cementum. It measures about 2 inches long and at the triturating surface is 9½ lines fore and aft and 9 lines transversely.

The specimens indicate a species about the size of *Hippotherium venustum* and *H. speciosum*, but the folding of the enamel on the triturating surface of the upper molar, as represented in the accompanying figure, is sufficiently different from the arrangement in the corresponding teeth of those species, to render it probable that the fossils belong to neither of them.



In *H. venustum* the inner column of the superior molars, so far as known, is regularly cylindrical; in *H. speciosum* it is compressed cylindrical. In the tooth under inspection it is much wider than in the latter. The fossils probably indicated an undescribed species, and for this the name *Hippotherium montezuma* was suggested.

Prof. Cope remarked that he believed that the contemporaneity of man with the horse and other extinct pliocene mammals in Western North America would soon be satisfactorily demonstrated. The first evidence on the subject was furnished by J. D. Whitney, Chief of the Geological Survey of California, in the case of the Calaveras skull, which was said to be taken from the gold-bearing gravel; and in several other cases subsequently added. From the fact that scientific observers were never present at the unearthing of the remains of man and his works from this formation, the evidence has been generally regarded as inconclusive. The gold-bearing gravel of California is, however, a very peculiar formation, and an object buried in it would carry such marks of its origin as to be quite recognizable. This was the case with the Calaveras skull when first discovered, as I am informed by Prof. Verrill of Yale College. This gentleman states that the skull, when found, was partially filled and covered with the hard adhesive "cement" so characteristic of the formation.

Prof. Cope referred to two observations of his own made in

1879 in Oregon[1] and California,[2] which were confirmatory of the existence of man in the upper pliocene of both those States, but the evidence was in neither case absolutely conclusive.

The discovery that the tracks of several species of pliocene mammalia[3] in the argillaceous sandstones of the quarry of the Nevada State Prison at Carson, are accompanied by those of a biped resembling man, is a further confirmation of these views. The tracks are clearly those of a biped, and are not those of a member of the *Simiidæ*, but must be referred to the *Hominidæ*. Whether they belong to a species of the genus *Homo* or not, cannot be ascertained from the tracks alone, but can be determined on the discovery of the bones and teeth. In any case the animal was probably the ancestor of existing man, and was a contemporary of the *Elephas primigenius* and a species of *Equus*.

Professor LEWIS drew attention to the caution that should be taken in accepting as evidences of pliocene man any facts as yet not verified by scientific observers. While the facts proving a post-glacial man are indisputable, the existence of pre-glacial man, either in our own country or in Europe, is not attested by satisfactory evidence. The discoveries in California, just referred to, made for the most part by miners in their search for gold, carry with them several serious objections to the great antiquity assigned to the relics thus found.

In the first place, the characters of the implements are identical with those of modern workmanship, while the Calaveras skull closely resembles that of a modern Indian. The implements, consisting of large granite mortars, polished spearheads of obsidian, gaming disks, finely marked pendants of greenstone and syenite, hammers, pestles, arrowheads, beads, etc., are of quite as perfect workmanship as those produced by the present aborigines of the country. No modern implements surpass the beauty of the obsidian spearheads thus found. The fact is not generally mentioned that implements in all respects similar to those of the auriferous gravel occur upon the surface of the ground, having been made by well-known tribes. Nor is the skull in any way inferior to those of the present day.

Moreover, there is no evidence of the great antiquity either of the Calaveras skull or of the implements by the amount of weathering or corrosion that they have suffered. Unlike the palæolithic implements of Europe and of Eastern America, the spearheads and mortars of the Californian gravels are as fresh in appearance as those made by modern tribes. Nor is the compact gravel adhering to the Calaveras skull a mark of great antiquity, since the formation of even more compact gravels and conglomerates may occur in quite recent times. It is unnecessary here, in support of this fact, to more than mention the modern coins and other objects so frequently found in a compact gravel firmly cemented.

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[1] American Naturalist, 1880, p. 62.

[2] Loc. cit, 1878, p. 125.

[3] Loc. cit., 1881, p. 195 and 921.

Again, there is no sufficient evidence that the gravel in which many of these relics were reported to have been found was undisturbed. Most of the implements were found on the banks of streams, some of them in the bottom of river-beds, in both of which places landslips may have occurred, while the few found in shafts have never been satisfactorily demonstrated to lie in a position which could not have been disturbed.

The very fact that these relics all occur in a gold-bearing gravel may indicate the method by which many of them were buried. That gold-mining was carried on in these same gravels by the aborigines upon an extensive scale is well attested. Schoolcraft describes an ancient shaft which penetrated Table Mountain to a depth of 210 feet, at the bottom of which were human bones and implements. This is the very locality where a number of implements and a skull of supposed pliocene man were afterwards found. Other authorities might be quoted to show the numerous mining operations of the aborigines. The mortars already described were probably used in the process of extracting gold from the gravel.

Another point of importance is the fact that the earliest relics of man, either in the river gravels of Europe and Great Britain, or in those of the Delaware, are of an ancient type, unlike those of more recent times. These *palæolithic* implements, with the associated bones of animals now extinct, are the most certain evidences of primeval man, and belong to the age immediately following the glacial epoch. It is not, therefore, probable that the highly fashioned implements of California, having the most neolithic type, belong to a race of pre-glacial men anterior to those of the river gravels of Europe. The argument from analogy is so strong against the great antiquity of the Californian relics, that evidence of the most satisfactory kind must be required to support such a conclusion.

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